Uses of Lime for Controlling SO_3 Emissions

Lewis Benson – Carmeuse Technology Center
William Ellison – Ellison Consultants

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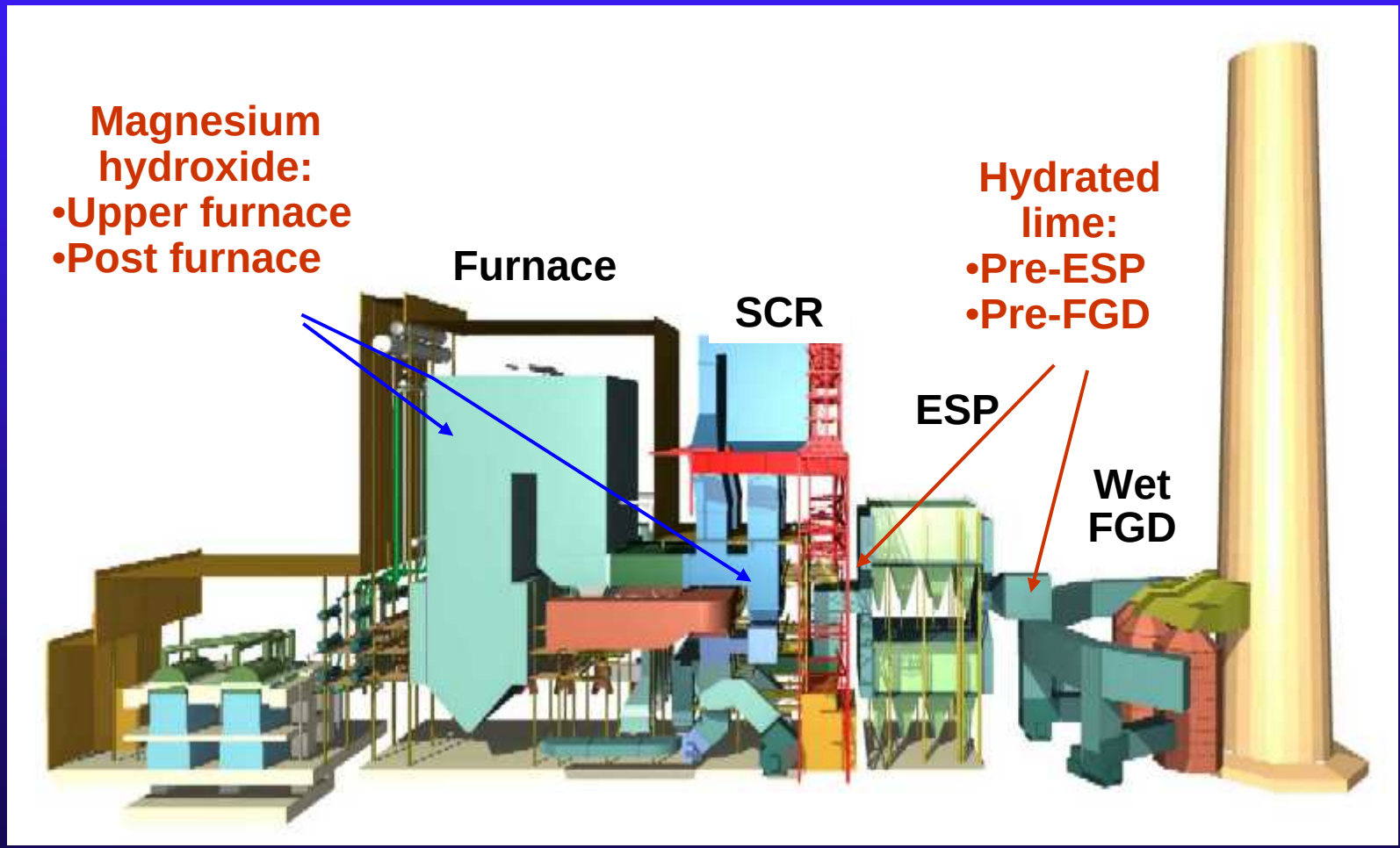
Overview

- Options for SO_3 reduction via injection of hydrated lime (calcium hydroxide)
- Full-scale injection experience
- Balance-of-plant effects
- Results of full-scale short-term tests of SO_3 control

Injection Locations for SO_3 Control with Calcium and Magnesium Hydroxides in Coal-fired Plants



Key Properties of Hydrated Limes for SO_3 Control

$Ca(OH)_2$, wt. %	92 - 95
Specific Surface Area, m^2/g	10 - 25
Average Particle Size, microns	4 - 10

Injection Location Option - pre-ESP

- Hydrated lime
  - Dry reagent
  - Full-scale experience and several trials
  - Site-specific trials required to determine required dosage rate and impact on ESP performance
  - Unused lime in flyash
    - May reduce lime use for stabilization

Injection Option - pre-wet FGD (spray, spray/tray, or venturi absorber)

- Hydrated lime –Dry reagent
  - Full-scale experience and trials
  - Site-specific trials required to determine required dosage rate and impact on particulate emissions
  - Unused lime collected in FGD scrubber
    - reduces FGD reagent use

Full-Scale Hydrated Lime Injection Applications

- Hydrated lime – pre-ESP
  - Zimmer 1300 MW, 1-3 TPH, 2 years in service
  - Cumberland – 2 x 1300 MW – in engineering
- Hydrated lime – pre-wet FGD
  - Widows Creek 8 - 550 MW (venturi scrubber) – 16 mo. in service
  - 650 MW (spray absorber) – ~6 mo. in service

Potential Balance-of-Plant Issues with Hydrated Lime Injection

- Pre-ESP
  - No significant adverse effect on ESP at addition rate of 3 TPH at Zimmer
  - Significant adverse effect on ESP at addition rate of >2 TPH at another 1300 MW unit with older ESP
  - No accumulation in ESP or ducts in newer 1300 MW unit
- Pre-FGD
  - Increase in particulate emission at high dosage rate at 650 MW unit

Effect of Specific Surface Area of Hydrated Lime on SO_3 Reduction

1300 MW, 1.8 TPH hydrated lime, 50 gpm byproduct $Mg(OH)_2$ slurry to furnace, SCR off

SSA, m^2/gram	Stack SO_3, ppmv
No lime addition	15
13	12
21	6.5
23	4

Summary

- Injection of hydrated lime applicable for SO_3 control
- Full-scale injection applications
- Options for hydrated lime injection location: pre-ESP, pre-FGD, pre-baghouse
- Improved SO_3 performance with higher surface area hydrated lime and humidification
- ESP performance with calcium hydroxide depends on ESP design